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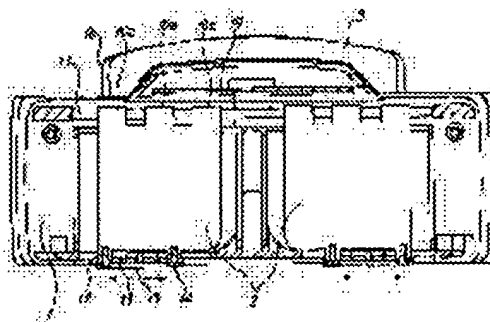
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(54) HEAD MOUNTED DISPLAY DEVICE

(57)Abstract:

PURPOSE: To provide a simple and compact head mounted display device without the complicated adjustment function of an optical system.

CONSTITUTION: Two left/right video display module sections 2 in pairs are mounted in a device 1 so as to be slidden horizontally. A head mount frame 16 of a head hold section 3 to be mounted on a head tightly is moved in forward/backward direction with respect to a device main body frame 1'. As a result, a distance between eyes and a video display module section and left and right positions are freely adjusted independently of each other for lots of unspecified users.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the head mounted display equipment (henceforth HMD equipment) which can be used to many and unspecified men.

[0002]

[Description of the Prior Art] In recent years, the graphic display device various type is developed with development of graphic display devices, such as a liquid crystal panel. One of them is HMD equipment and a thing various type is being commercialized.

[0003] The thing it was made to suit many and unspecified users' eyesight is developed by giving diopter adjustment of optical system so that it can be used to all men as this kind of HMD equipment, and equipping optical system with an eyepiece attachment lens. Moreover, the optical system from which the glasses wearing person secures beforehand the air clearance of an eye and a display section front face from as HMD equipment to which it can view and listen as it is, and can secure sufficient optical engine performance to all men regardless of a glasses wearing person and a non-equipping person is adopted. It is thought that the reference about adjustment of the interpupillary distance cannot be seen and does not have a still effective means on the other hand.

[0004]

[Problem(s) to be Solved by the Invention] However, in said conventional example, adjustment of a diopter on either side is left to the adjustment and decision by the user in diopter adjustment or the diopter adjustment by wearing of an eyepiece attachment lens. On the other hand, in a sensitive sense organ called an eye, there is a possibility that a difference with the diopter at the time of display viewing and listening may usually occur to viewing and listening of long duration. Moreover, as a result, the diopter difference in right and left arises, a temper may worsen or physiological problems -- dizziness arises -- may be generated.

[0005] Moreover, carrying out complicated adjustment function and addition of a lens to optical system has complicated optical system, and its optic will increase, it becomes difficult to suppress physiological precision (optical dispersion of the graphic display section on either side), and even if stopped, it has the technical problem that it becomes an expensive, also structurally big thing.

[0006] Moreover, in the HMD equipment to which it can view and listen while the distance of an eye and the graphic display section had equipped with glasses using securable enough optical system, to the wearing person (glasses non-equipping person) who does not need the space (insertion space of glasses), the location of an eye becomes far beyond the need and becomes disadvantageous about optical tolerance. Moreover, a center's of gravity moving ahead to glasses a non-equipping person and the technical problem that it is disadvantageous also about protection from light with the external world occur by securing the insertion space of glasses beforehand.

[0007] Moreover, the technical problem that there is no effective means for performing the adjustment device for uniting with the width of face of many and unspecified eyes in the conventional example with a sufficient precision occurs. This invention does not have an adjustment function in complicated optical

system with careful attention to said conventional problem, and it aims at offering compact HMD equipment simply.

[0008]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is considered as the configuration which enables a slide of the head hold section to the body section of equipment, and can change the air clearance of an eye and the graphic-display module section in the HMD equipment which consists of the head hold section of the glasses mold for equipping the body section of equipment and the head which consist of the two graphic-display module sections equipped with optical system and an indicating equipment, or a goggles mold.

[0009] Moreover, the graphic display module section of two right and left is taken as the configuration which precision improves adjustment movable to right and left with an adjustment tongue.

[0010]

[Function] The air clearance of an eye and the graphic display section can be changed by the above-mentioned configuration, and the wearing person of glasses can offer an image with high tolerance more nearly optically to a non-equipping person from the first. Moreover, it is possible to double the location of a graphic display module with the location of an eye with the adjustment tongue with which right and left became independent.

[0011] Consequently, the factor by which viewing and listening of of infinite variety and many and unspecified men is attained to the physiological disorder which is the big technical problem of HMD equipment is reducible. Furthermore to glasses a non-equipping person, HMD equipment with it can be offered optically. [high and tolerance and] [compact]

[0012]

[Example] Hereafter, it explains, referring to drawing 1 - drawing 3 about one example of this invention. In drawing, 1 is the body section of equipment which has the two graphic display module sections 2 right and left, and 3 is the head hold section. The graphic display module section 2 in the body section 1 of equipment The optical block which consists of lenses 4 and 5 and a lens holder 6 as shown in drawing 3 , It consists of the LCD electrode holder 7, a liquid crystal panel 8, a back light 9, and a power source for back lights (not shown). It has three sliding pieces 10a, 10b, and 10c in the upper part, it inserts in the metallic pipe 11 which constructed these sliding pieces 10a-10c over the longitudinal direction in the body section 1 of equipment, and can slide to right and left freely. Moreover, the graphic display module section 2 has a lobe 12 in the lower part, and inserts this lobe 12 in the guide-rail slot 13 of the lower part of the body section 1 of equipment, and combines the adjustment tongue 15 with a screw thread 14, and has come to be able to carry out slide adjustment of the graphic display module section 2 with the slide of this adjustment tongue 15.

[0013] As the head hold section 3 is shown in drawing 2 , it consists of a head maintenance frame 16 and head fixed parts 17, such as goggles, and the head maintenance frame 16 is combined with body frame of equipment 1' free [the slide to order] in the upper part of the body 1 of equipment. And it is used so that the vertical wall 18 of the back of the head maintenance frame 16 may contact the frame of a head. In addition, although not illustrated, the slide lock device is prepared in the head maintenance frame 16. 19 in drawing is an electrical circuit plate, and 20 is an interconnection cable.

[0014] In the above-mentioned configuration, the two graphic display module sections 2 are made to slide to right and left with the adjustment tongue 15, and are made as for adaptation adjustment to the width of face of an eye, and the graphic display module section 2 can adjust air clearance with a head (frame) by making the head hold section 3 slide forward and backward.

[0015] In addition, although goggles is given to the head hold section in the example, it is good also as a glasses mold configuration.

[0016]

[Effect of the Invention] According to this invention, viewing and listening of all men is possible by sliding the head hold section, without asking optical system about wearing of glasses and un-equipping, without giving a complicated adjustment function so that more clearly than explanation of the above example. Moreover, to the non-equipping person of glasses, a center of gravity can approach a face and

can take more nearly lightweight and compact structure. Moreover, since a complicated adjustment function is not used for optical system, either, an optical precision is easily securable. moreover, it is possible to achieve right-and-left independence of each to the width of face of all men's eye with a lower adjustment tongue, and to adjust the graphic display module section with a sufficient precision.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view which looked at the HMD equipment of one example of this invention from the transverse plane

[Drawing 2] The sectional view which looked at this HMD equipment from the side face

[Drawing 3] The sectional view showing the structure of the graphic display module section in this HMD

[Description of Notations]

- 1 Body of Equipment
- 2 Graphic Display Module Section
- 3 Head Hold Section
- 4 Lens
- 5 Lens
- 6 Lens Holder
- 7 LCD Electrode Holder
- 8 The LCD Panel
- 9 Back Light
- 10, 10a, 10b, 10c Sliding piece
- 11 Metallic Pipe
- 12 Lobe
- 13 Guide-Rail Slot
- 14 Screw Thread
- 15 Adjustment Tongue
- 16 Head Maintenance Frame
- 17 Head Fixed Part
- 18 Vertical Wall
- 19 Electrical Circuit Plate
- 20 Interconnection Cable

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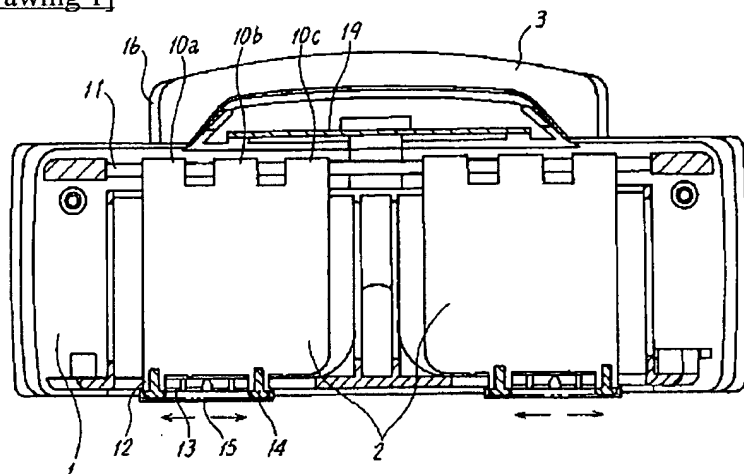
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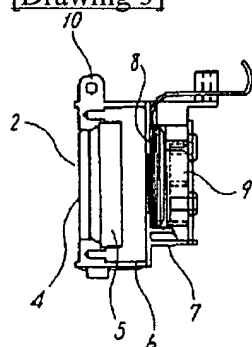
DRAWINGS

[Drawing 1]

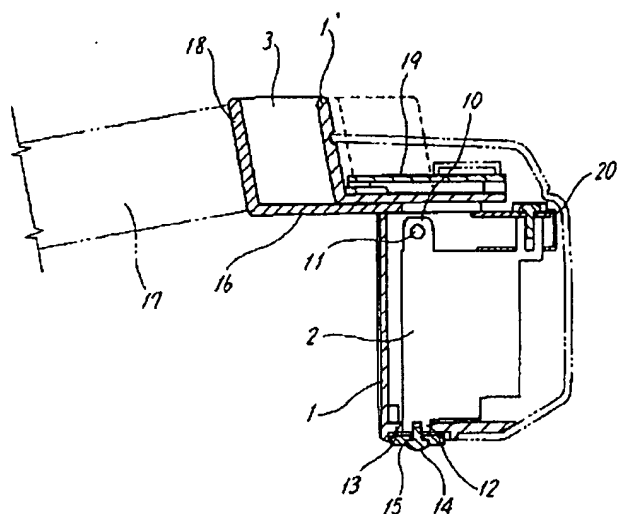


- | | | |
|--------------|----------|------------|
| 1 装置本体 | 10 摺動片 | 13 ガイドレール溝 |
| 2 映像表示モジュール部 | 11 金属パイプ | 15 調整つまみ |
| 3 頭部ホルダ部 | 12 突出部 | |

[Drawing 3]



[Drawing 2]



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